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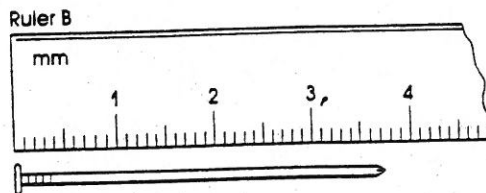
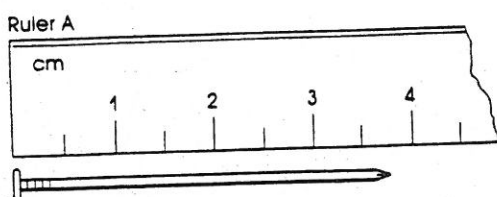
Chemistry 11
 Precision and Accuracy

Accuracy is an indication of how close to a measured value comes to the true value.

Precision refers to the amount of uncertainty in the measurement.

A mass reading such as 3.52 g, has three significant figures, is more **precise** than a mass reading 3.5 g, as it has only two significant figures.

The same nail is placed alongside the scale of TWO DIFFERENTLY incremented rulers (as seen below)



1. Use the above diagrams to complete the following CHART:

	RULER A	RULER B
Smallest division of the ruler		
Length of the nail as measured on the ruler		
Number of significant figures		
Uncertainty (\pm cm)		

2. Which of the above rulers allows for a more **precise** measurement? Why?

3. A micrometer determines that the actual length of the nail is 3.8001 cm. Which of the above measurements is more **accurate**? Why?

THE GOAL IN CHEMISTRY IS TO GET A VALUE THAT IS BOTH ACCURATE AND PRECISE

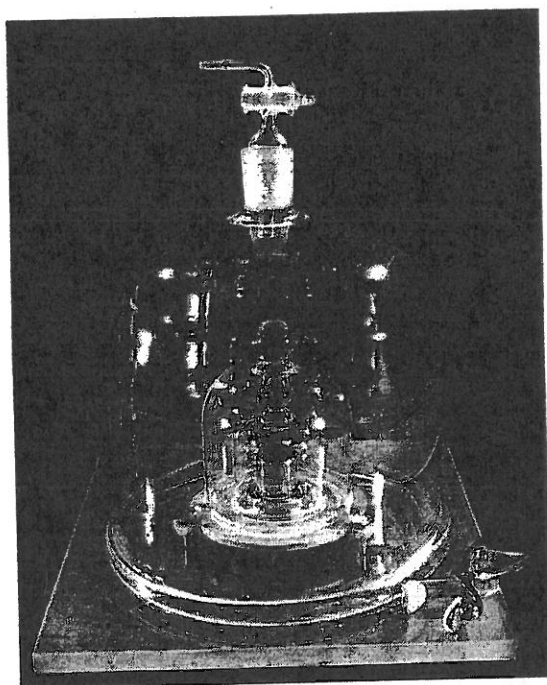


Figure 1.3.2 This kilogram mass was made in the 1880s and accepted as the international prototype of the kilogram in 1889. (© BIPM — Reproduced with permission)

The 1-kg mass kept in a helium-filled bell jar at the BIPM in Sèvres, France, is the only exact mass on the planet (Figure 1.3.2). All other masses are measured relative to this and therefore have some degree of associated uncertainty.

Accuracy refers to the *agreement* of a particular value with the *true value*.

Accurate measurements depend on careful design and calibration to ensure a measuring device is in proper working order. The term **precision** can actually have two different meanings.

Precision refers to the reproducibility of a measurement (or the agreement among several measurements of the same quantity).

- or -

Precision refers to the exactness of a measurement. This relates to uncertainty: the lower the uncertainty of a measurement, the higher the precision.

Quick Check

Volumetric devices measure liquids with a wide variety of precisions.

- Which of these is likely the *most precise*?

- Which is likely the *least precise*?

- Is the *most precise* device necessarily the *most accurate*?

- Discuss your answers.

